

WIRELESS NETWORKS

INTRODUCTION

If you have two or more PCs in your house, it makes sense to network them together, particularly if you have a broadband connection. A home network lets you access the internet from any of your PCs, share files and folders around the house and even enjoy multiplayer games.

Most people don't want wires trailing all over their home or to go to the trouble and expense of installing a wired network. A wireless network avoids both and needn't compromise performance or security. As an added benefit, if you have a notebook PC, a wireless-equipped PDA or mobile phone or even a Nintendo DS, a wireless network lets you connect it to the internet from anywhere in the home.

The Draft-N routers and adaptors in this month's Labs test are claimed to run five times faster than the current 54g standard. We've tested 23 wireless products from a range of manufacturers so you can network your home wirelessly.

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THE LINKS EFFECT

If you have several PCs, broadband and an aversion to tripping over cables, you need a wireless network. We test 23 of the latest wireless routers and network adaptors to ensure that your PCs get along famously

Choosing a... Wireless Network

The heart of a wireless network is the router, which links all your wireless (and wired) devices together and connects them to your broadband service. There are two main types of wireless router: those with integrated ADSL modems and those without. If you receive your broadband internet down a BT phone line through a USB modem, you need an ADSL modem router. If you have a cable modem that connects to your PC's Ethernet port or any other kind of Ethernet modem, a normal non-ADSL router will do. All the ADSL modem routers here support ADSL2+, so they can connect to 8Mbit/s or faster ADSL connections.

STANDARD CLASS

Wireless routers are also rated at different speeds. The fastest ratified standard is 802.11g, which according to manufacturers runs at 54Mbit/s. A new wireless networking standard is on the horizon, though, called 802.11n. While the final specifications of 802.11n have yet to be finalised, several manufacturers have brought out wireless equipment based on the first draft of the standard, called Draft-N, which they claim is up to five times faster than 802.11g. We found that while Draft-N equipment was faster than 802.11g, it fell far short of the claimed 270Mbit/s or 300Mbit/s. Also, as Draft-N is

not a standard, there's no guarantee that Draft-N equipment from one manufacturer will work with Draft-N kit from another.

Most modern notebooks, and all Intel Centrino notebooks, have integrated 802.11g networking. This means they can connect to any wireless network without any extra equipment, but at only 802.11g speeds. If you have an older notebook or you want to take advantage of faster Draft-N networks (or 802.11g networks with non-standard turbo modes) you'll need a CardBus or USB adaptor that supports those modes. Routers typically have four wired ports that you can use to connect static desktop PCs to your network. However, if you want to connect a PC wirelessly, you'll need to buy a PCI or USB adaptor for it.

Bear in mind that old notebooks with 16-bit PC Card slots won't be able to use modern 32-bit CardBus adaptors, and you'll need a USB2 port rather than USB 1.1 to take advantage of high-speed USB wireless adaptors. Some routers also use Multiple In, Multiple Out (MIMO) technology. These have three aerials instead of the usual one or two, and can increase the range of your network. You don't need a special wireless adaptor to take advantage of a MIMO router's increased range.



If you don't have a MIMO router but your router has antennae sockets, you can use a third-party high-gain antenna. Some routers support the Wireless Distribution System (WDS), which enables you to add further routers and access points to extend the range of your network.

NATIONAL SECURITY

All the routers support Wired Equivalent Privacy (WEP) encryption, but this can be cracked and you should use it only if you have an older wireless adaptor that doesn't support the newer and more secure WPA system. If you have Windows XP Service Pack 2, you can also use the latest WPA2 standard, which is the most secure wireless encryption available. Every router in this test supports WPA2, and five of them support RADIUS, which provides an extra level of security and is best for corporate networks. The routers also all support MAC address filtering, which restricts access to your network to just those PCs you specify. See this month's feature 'Secure your WiFi network' (page 135) for a full tutorial.

Every router here has a hardware firewall to protect you from internet-based attacks. They all support network address translation (NAT), which means that every computer connects to the internet using the router's IP address rather than its own. This makes it impossible for anyone to attack your home PCs directly from the internet. They also use stateful packet inspection

(SPI), which inspects each packet attempting to cross the firewall and rejects any that don't belong to a current connection.

By default, a firewall blocks some, or all, incoming connections to your PCs. This will cause some applications such as webcams or online games to stop working. You get round this by using port forwarding, where the router forwards traffic that it would otherwise block to a specific PC on your network. All the routers in the group support port forwarding. If you need a certain PC on your network to have unfettered access to the internet, you can put that PC in a demilitarised zone (DMZ), which is outside your firewall. If the demilitarised PC is compromised, hackers may be able to gain access to the rest of your network, so use it as a last resort.

OTHER FEATURES

There are a couple more features that all the routers in the group support. You'll need to use a free service such as DynDNS.com if you want to run a web or FTP server on a home broadband connection with a dynamic IP address. If your home IP address changes, Dynamic DNS updates its entry so visitors to your web or FTP server are directed to the new IP address. Finally, UPnP makes configuring your router easier. It places a shortcut to the router's configuration page in Windows' My Network Places, and can make port forwarding easier to configure.

This month

ADSL WIRELESS 54G DEVICES

BUFFALO

Wireless G Broadband
ADSL2+ Modem Router
High Power Wireless
CardBus Adaptor
Page 100



SMC

Barricade g Wireless
ADSL2+ Router
Wireless CardBus Adaptor
Wireless PCI Card
Page 104



US ROBOTICS

Wireless MAXg ADSL2+
Gateway
Wireless MAXg PC Card
Wireless MAXg USB Adaptor
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ADSL WIRELESS DRAFT-N DEVICES

BELKIN

N1 Wireless Modem Router
N1 Wireless Notebook Card
N1 Wireless USB Adaptor
Page 100



D-LINK

RangeBooster N
ADSL2+ Router
RangeBooster N 650
Notebook Adaptor
RangeBooster N USB 2.0 Adaptor
RangeBooster N 650 Desktop Adaptor
Page 100



NETGEAR

RangeMax Next Wireless
ADSL2+ Modem Router
RangeMax Next Wireless
Notebook Adaptor
RangeMax Next Wireless
N USB2.0 Adaptor
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WIRELESS DRAFT-N DEVICES

D-LINK

RangeBooster N 650
Gigabit Router
RangeBooster N 650
Desktop Adaptor
RangeBooster N 650 Notebook Adaptor
RangeBooster N USB 2.0 Adaptor
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LINKSYS

Wireless N Broadband Router
Wireless N Notebook Adaptor
Wireless N PCI Adaptor
Page 103



NETGEAR

RangeMax Next Wireless Router
RangeMax Next Wireless
Notebook Adaptor
RangeMax Next Wireless
N USB2.0 Adaptor
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BUFFALO



Wireless G Broadband ADSL2+ Modem Router

★★★★★
£37 inc VAT



High Power Wireless CardBus Adapter

★★★★★
£26 inc VAT



While the Netgear routers' white finish looks modern and smart, the Buffalo Wireless G's off-white plastic makes it look like an early-1990s modem. The CD doesn't have a setup wizard, and for some reason includes manuals for several Buffalo products but not the router it came with. We had to download the manual from the Buffalo website. Fortunately, the router's web configuration has its own wizard, which includes setting up wireless security.

The router's setup page isn't exactly a triumph of design. Clicking the Advanced button brings up a huge list of options down the left-hand side of your browser, and you need to do a fair bit of scrolling to find the option you want. The help files are also clustered together on their own page rather than on the relevant setup page.

When you install the Buffalo CardBus card, you have the option to install just the driver without the wireless utility, which makes a welcome change for those who don't like clogging up their PC with unnecessary applications. When coupled with its own card, the Buffalo router was fast in our tests. It was slower than the US Robotics router and CardBus combination at 1m with 24.92Mbit/s, but was quicker at 15m with 22.09Mbit/s. We couldn't get a signal at 25m with the CardBus adaptor.

The Buffalo router was slower with our Centrino notebook, achieving speeds of 19.08Mbit/s at 1m and 18.65Mbit/s at 15m. However, at 25m we could transfer files at a respectable 7.56Mbit/s.

Buffalo's Wireless G ADSL router may look dated and have a fiddly setup program, but it has respectable 54g performance with both our Centrino notebook and the Buffalo CardBus adaptor. It's good value.

SUMMARY

- ☒ Good all-round performance
- ☒ Cheap
- ☒ Fiddly setup

ADSL WIRELESS ROUTER Draft 802.11g (54Mbit/s), four 10/100 LAN ports, WAN port (ADSL2+ modem), UPnP
PART CODE WBMR-G54 SUPPLIER www.lambda-tek.com
CARDBUS WIRELESS ADAPTOR Draft 802.11g (125Mbit/s)
PART CODE WLI-CB-G54HP
SUPPLIER www.ebuyer.com
DETAILS www.buffalo-technology.com



BELKIN

N1 Wireless Modem Router

★★★
£120 inc VAT

N1 Wireless Notebook Card

★
£58 inc VAT

N1 Wireless USB Adapter

★
£67 inc VAT



Belkin's N1 router is full of clear instructions and diagrams, which refer to the router's various parts with numbers that correspond to numbers stuck to the router's ports, power supply and so on.

The setup CD guides you through naming your wireless network and connecting to your ADSL internet connection. It doesn't help you with wireless security, so you have to set up your wireless encryption through the web-based interface. The router's various options are split into clear categories, and most have comprehensive help text.

When connected to a Centrino notebook, the N1 performed well in our tests. Its 1m and 15m speed results of 20.97Mbit/s and 19.83Mbit/s were in the top half of the group, but 5.75Mbit/s was only average for the long-range 25m test. Belkin's matching N1 PC Card and USB adaptors have a claimed throughput of 270Mbit/s when used with the N1 router. The setup programs for both adaptors were easy to use, and helped us find and connect to the wireless network. The wizards don't tell you to reboot, though, and we found that the adaptor wouldn't connect unless we did.

Trying to get the N1 router to work with the N1 adaptors was tricky. The CardBus card would connect, but kept dropping its connection before we could complete our tests. We tried every combination of wireless channel and data rate to no avail. The USB adaptor held a stable connection, but would run only at less than 1Mbit/s.

Belkin's N1 router is easy to set up and works well with Centrino notebooks, but the problems we had with its own Draft-N adaptors make it impossible to recommend.

SUMMARY

- ☒ Clear setup
- ☒ Poor Draft-N implementation
- ☒ Expensive

ADSL WIRELESS ROUTER Draft 802.11n (270Mbit/s), four 10/100 LAN ports, WAN port (ADSL2+ modem), UPnP
PART CODE F5D8631UK4A
SUPPLIER www.morecomputers.co.uk
CARDBUS WIRELESS ADAPTOR Draft 802.11n (300Mbit/s)
PART CODE F5D8011UK SUPPLIER www.ebuyer.com
USB WIRELESS ADAPTOR Draft 802.11n (300Mbit/s)
PART CODE F5D8051UK SUPPLIER www.ebuyer.com
DETAILS www.belkin.com/uk



D-LINK

RangeBooster N ADSL2+ Router

★★★★★
£107 inc VAT

RangeBooster N 650 Notebook Adapter

★★★★★
£53 inc VAT



RangeBooster N USB 2.0 Adapter

★★★
£60 inc VAT



RangeBooster N 650 Desktop Adapter

★★★
£59 inc VAT



D-Link's RangeBooster N ADSL2+ router feels well made. The setup CD tells you how to set up the router and your connection and lets you enforce encryption immediately, so your network is always secure.

The web-based configuration page isn't very clear. There are four categories of options at the top of the page and each has its own options subset, so remembering where to find a certain option isn't always easy.

The D-Link router's performance with its matched CardBus adaptor was mediocre until we switched to wireless channel one from the default channel six. After that it was the fastest router overall in the 1m test, at 46.33Mbit/s. The 15m test was disappointing at 21.48Mbit/s, but 9.21Mbit/s at 25m was the best result for a Draft-N ADSL router.

The PCI card was much slower. It managed just 22.82Mbit/s at 15m and wasn't able to hold its connection at 25m. When we connected our Centrino notebook to the network, we got mediocre speed results at 1m and 15m of 19.36Mbit/s and 18.11Mbit/s, but the speed of 9.13Mbit/s at 25m is excellent.

If you're upgrading an existing router because you're experiencing a bad signal at long range, the D-Link RangeBooster N ADSL2+ is a good bet. However, you'll get better mid-range performance with NetGear's RangeMax Next ADSL router.

SUMMARY

- ☒ Fast with CardBus adaptor
- ☒ Good long-range performance
- ☒ Poor speed with PCI card

ADSL WIRELESS ROUTER Draft 802.11n (270Mbit/s), four 10/100 LAN ports, WAN port (ADSL2+ modem), UPnP
PART CODE DSL-2740B SUPPLIER www.lambda-tek.com
CARDBUS WIRELESS ADAPTOR Draft 802.11n (270Mbit/s) PART CODE DWA-645 SUPPLIER www.kikatek.com
USB WIRELESS ADAPTOR Draft 802.11n (270Mbit/s) PART CODE DWA-142 SUPPLIER www.kikatek.com
PCI WIRELESS ADAPTOR Draft 802.11n (270Mbit/s) PART CODE DWA-547 SUPPLIER www.kikatek.com
DETAILS www.d-link.com



D-LINK RangeBooster N 650 Gigabit Router

★★★★★
£108 inc VAT

RangeBooster N 650
Notebook Adapter

★★★★★
£53 inc VAT

RangeBooster N
USB 2.0 Adapter

★★★
£60 inc VAT

RangeBooster
N 650 Desktop
Adapter

★★★
£59 inc VAT

D-Link's RangeBooster N 650 is a Draft-N router with an integrated Gigabit switch rather than the 10/100 switches built into most. It's compact and feels well made.

The setup wizard clearly explains how to connect the router physically, and lets you set up wireless encryption. Unfortunately, if it can't detect an internet connection it won't stop searching, and you have to run Windows Task Manager to force the program to close. The web setup has the same tricky layout as the ADSL version (see left).

The RangeBooster N 650 was the only Draft-N router in the group to work first time with its matching CardBus, USB and PCI adaptors. It was quick at 1m and 15m with the desktop PCI card, with scores of 40.86Mbit/s and 34.35Mbit/s, while speeds of 40.74Mbit/s and 31.93Mbit/s with the CardBus adaptor puts it near the top of the group. With the matching USB adaptor it managed 31.07Mbit/s at both 1m and 15m. The router struggled at long range with the PCI and USB adaptors, and couldn't hold a signal long enough to complete our tests. It came top of the group in the Centrino notebook test with 21.51Mbit/s and 20.82Mbit/s at 1m and 15m, but again it couldn't hold its signal at 25m.

If you need a fast, long-range modemless router, get the cheaper Netgear RangeMax.

SUMMARY

- ✓ Worked first time
- ✓ Gigabit switch
- ✗ Struggles at long range

WIRELESS ROUTER Draft 802.11n (300Mbit/s), four 10/100/1000 LAN ports, WAN port, UPnP PART CODE DIR-655 SUPPLIER www.lambda-tek.com CARDBUS WIRELESS ADAPTOR Draft 802.11n (270Mbit/s) PART CODE DWA-645 SUPPLIER www.kikatek.com USB WIRELESS ADAPTOR Draft 802.11n (270Mbit/s) PART CODE DWA-142 SUPPLIER www.kikatek.com PCI WIRELESS ADAPTOR Draft 802.11n (270Mbit/s) PART CODE DWA-547 SUPPLIER www.kikatek.com DETAILS www.d-link.com



LINKSYS Wireless N Broadband Router

★★★★
£79 inc VAT

Wireless N
Notebook Adapter

★
£64 inc VAT

Wireless N PCI
Adapter

★
£58 inc VAT

The Linksys Wireless N Broadband Router's setup wizard uses diagrams to guide you through the setup process, and the instructions are very clear. However, even though the router was plugged into our test PC with an Ethernet cable, the setup wizard couldn't find it and refused to continue the setup. We had to quit the wizard and use the router's web setup to configure the wireless network. The web-based interface is logical and has plenty of online help.

Transferring files to and from our Centrino notebook was slow at first, but improved greatly once we switched to channel one. The Linksys Wireless N gave the best overall performance in the Centrino tests. It managed 21.51Mbit/s at 1m, 20.8Mbit/s at 15m and a particularly quick 11.66Mbit/s at 25m.

Unfortunately, we had less success with the CardBus and PCI adaptors. The router wouldn't hold its connection at the default settings, but after a lot of fiddling with the wireless channels and a couple of firmware updates we managed to get a stable connection. It was still slow to transfer files, managing just 16.03Mbit/s at 1m and 14.62Mbit/s at 15m with the CardBus adaptor and 13.48Mbit/s and 7.71Mbit/s with the PCI card. This is far slower than the other Draft-N routers and even slower than the Linksys router's own 54g speeds.

It's a shame that the Linksys Wireless N Broadband Router's Draft-N mode is so poor, as it is fast and has plenty of range in 54g mode. If you have a Centrino notebook, this long-range performance could be worth the price – just ignore the Draft-N facility.

SUMMARY

- ✓ Very good Centrino performance
- ✗ Poor Draft-N performance
- ✗ Not cheap

WIRELESS ROUTER Draft 802.11n (300Mbit/s), four 10/100 LAN ports, WAN port, UPnP PART CODE WRT300N-UK SUPPLIER www.morecomputers.co.uk CARDBUS WIRELESS ADAPTOR Draft 802.11n (300Mbit/s) PART CODE WPC300N-UK SUPPLIER www.broadbandbuyer.co.uk PCI WIRELESS ADAPTOR Draft 802.11n (300Mbit/s) PART CODE WMP300N-UK SUPPLIER www.lambda-tek.com DETAILS www.linksys.com



NETGEAR RangeMax Next Wireless Router

★★★★★
£89 inc VAT

RangeMax Next
Wireless Notebook
Adapter

★★★★★
£55 inc VAT

RangeMax NextWireless
N USB2.0 Adapter

★★★★★
£55 inc VAT

While D-Link's Draft-N router and ADSL router are different designs, the two Netgear routers look identical. The RangeMax Next doesn't have an integrated ADSL modem, so it's better suited to sharing a cable internet connection.

The RangeMax's setup program is odd. A large sticker covering the router's Ethernet ports tells you to run the CD before plugging in the router, but the setup program quits if it can't find the router. You have to set up the router before running the setup program. Even when the router was plugged in, our company firewall meant the router couldn't detect an internet connection, so we couldn't finish the wizard. Setting up the router manually worked, once we restored it to factory settings.

Centrino performance was near the bottom of the group, with 18.12Mbit/s at 1m and 19.07Mbit/s at 15m. Getting it to work properly with the Netgear Draft-N CardBus adaptor required some fiddling. File-transfer speeds were very slow until we set the router to wireless channel one and 130Mbit/s instead of 270Mbit/s, after which the speeds shot up to 44.77Mbit/s at 15m. The network was sluggish at close range though, with a file-transfer speed of just 30.73Mbit/s at 1m.

The RangeMax Next Router worked reasonably well with Netgear's USB adaptor, if only in 130Mbit/s mode. Its speed of 13.7Mbit/s at a range of 25m was the best of all the devices in this month's test.

The RangeMax Next router has an odd setup program, but its performance is fairly consistent with the CardBus and USB adaptors and it is better at long range than D-Link's RangeBooster 650. It's the best non-ADSL

SUMMARY

- ✓ Fast performance with CardBus adaptor
- ✓ Fast performance with USB adaptor
- ✗ Mediocre Centrino performance

WIRELESS ROUTER Draft 802.11n (270Mbit/s), four 10/100 LAN ports, WAN port, UPnP PART CODE WNR834B SUPPLIER www.lambda-tek.com CARDBUS WIRELESS ADAPTOR Draft 802.11n (270Mbit/s) PART CODE WN511B SUPPLIER www.yoyotech.co.uk USB WIRELESS ADAPTOR Draft 802.11n (300Mbit/s) PART CODE WND121T SUPPLIER www.morecomputers.co.uk DETAILS www.netgear.com



NETGEAR



RangeMax Next Wireless ADSL2+ Modem Router

★★★★★
£92 inc VAT



RangeMax Next Wireless Notebook Adapter

★★★★★
£55 inc VAT

RangeMax Next Wireless N USB2.0 Adapter

★★★★★
£55 inc VAT

Netgear's RangeMax Next ADSL Router is the best-looking ADSL router in the group, thanks to its white finish and lack of external aerials. It's also the cheapest Draft-N ADSL router in this month's *Labs* test.

The setup wizard on the CD helps you to install the router physically with a sequence of small diagrams. You then set it up with the web-based interface, which gives you the choice of using the wizard or setting it up manually. Unfortunately, if you later change your mind and want to use the manual setup, you have to restore the router to its factory defaults, which is annoyingly nannyish.

At first, the RangeMax Next was horribly slow with our test Centrino notebook, but once we changed the wireless channel from channel six to automatic mode it was very fast at 1m and 15m. Its scores of 21.33Mbit/s and 20.8Mbit/s were the fastest from the ADSL Draft-N routers, but its 25m score of 3.96Mbit/s was below average.

When connected to the RangeMax Next CardBus adaptor, the router kept dropping its connection, but setting the router manually to wireless channel one solved the problem. The router was the second fastest overall at 1m with 41.41Mbit/s, and was the fastest ADSL router at 15m with 35.72Mbit/s. Again it was slow at 25m, with just 2.07Mbit/s.

Netgear's RangeMax Next ADSL router is affordable and fast at all but the longest ranges. Unless range is your main priority, it's the best Draft-N router here.

SUMMARY

- ☒ Fast Centrino performance
- ☒ Fast CardBus performance
- ☒ Overly cautious setup

ADSL WIRELESS ROUTER Draft 802.11n (270Mbit/s), four 10/100 LAN ports, WAN port (ADSL2+ modem), UPnP PART CODE DG834N SUPPLIER www.microdirect.co.uk CARDBUS WIRELESS ADAPTOR Draft 802.11n (270Mbit/s) PART CODE WN511B SUPPLIER www.yoyotech.co.uk USB WIRELESS ADAPTOR Draft 802.11n (300Mbit/s) PART CODE WN121T SUPPLIER www.morecomputers.co.uk DETAILS www.netgear.com



SMC

Barricade g Wireless ADSL2+ Router

★★★
£43 inc VAT

Wireless CardBus Adaptor

★★★
£16 inc VAT

Wireless PCI Card

★
£14 inc VAT

SMC's Barricade G is more compact than the other routers in the group and has the luxury of an on/off switch.

The router comes with a clear setup sheet, but there is no setup wizard on the CD. The web interface is well laid out and looks much more professional than the Buffalo's. The setup wizard has presets for the major UK ISPs, but it doesn't help you set up wireless security. Doing this manually is confusing, as the wizard displays the complicated RADIUS setup screen even if you select WPA-PSK.

The CardBus adaptor is easy to install, but the PCI card's packaging doesn't tell you to run the setup wizard before installing the card. If you install the card before running the setup program, Windows runs the Add New Hardware Wizard and messes up the whole installation.

The SMC router worked well with our Centrino notebook at short range. It transferred files at 19.82Mbit/s at a range of 1m, and 19.51Mbit/s at 15m. However, it was the only 54g router to fail the 25m Centrino test. Performance with the SMC CardBus and PCI cards was poor. With the CardBus adaptor we got just 14.99Mbit/s at 15m, and the PCI adaptor couldn't hold its connection at 15m to complete the test. Like all the 54g routers, the SMC failed the 25m test when paired with its own-brand adaptor.

SMC's Barricade G wireless router is compact, inexpensive and fairly easy to set up. However, although it's fast with a Centrino notebook at shorter distances it struggles at long range. It's also slow with SMC's own CardBus and PCI adaptors. The cheaper Buffalo router is a better buy.

SUMMARY

- ☒ Fast short-range Centrino performance
- ☒ Poor performance with own-brand adaptors
- ☒ No signal at 25m

ADSL WIRELESS ROUTER 802.11g (54Mbit/s), four 10/100 LAN ports, WAN port (ADSL2+ modem), UPnP PART CODE SMC7904WBRA2 SUPPLIER www.broadbandstuff.co.uk CARDBUS WIRELESS ADAPTOR 802.11g (108Mbit/s) PART CODE SMCWCBT-G SUPPLIER www.ebuyer.com PCI WIRELESS ADAPTOR 802.11g (108Mbit/s) PART CODE SMCWPCIT-G SUPPLIER www.lambda-tek.com DETAILS www.smc.com



US ROBOTICS

Wireless MAXg ADSL2+ Gateway

★★★★
£62 inc VAT

Wireless MAXg PC Card

★★★★
£27 inc VAT

Wireless MAXg USB Adaptor

★★★★
£27 inc VAT

US Robotics' Wireless MAXg ADSL2+ Gateway is one of the largest routers in the group. Its grey plastic finish feels tough and well made.

The setup CD is an odd hybrid. It will configure your ADSL connection, but launches a web browser to set up wireless encryption. The web-configuration page is the easiest to use in the group. All the options are arranged in drop-down menus, which make it easy to find some of the more obscure options. It also has a USB port, which lets you share your USB printer wirelessly over the network.

The US Robotics router is the only 54g router in the group with a turbo mode. The manufacturer claims that it boosts its throughput to 125Mbit/s with a suitable adaptor. As with the Draft-N routers, the actual figure was far short of this, but in conjunction with the PC Card adaptor the router was still quicker than the other 54g equipment at short ranges. At 1m we managed to transfer files at 28.57Mbit/s, but a speed of 15.19Mbit/s at 15m was worse than the Buffalo router could manage.

The USB adaptor was slower, with a file-transfer speed of 21.13Mbit/s at 1m and 13.2Mbit/s at 15m. The US Robotics router was the fastest 54g device with our Centrino notebook at 15m, managing 20.47Mbit/s. It struggled at very long range, though, managing just 4.66Mbit/s in the 25m test.

US Robotics' Wireless MAXg ADSL2+ Gateway has the best web interface in the group and respectable performance over medium distances. It's not as fast as we were expecting, though, and is far more expensive than the other 54g routers.

SUMMARY

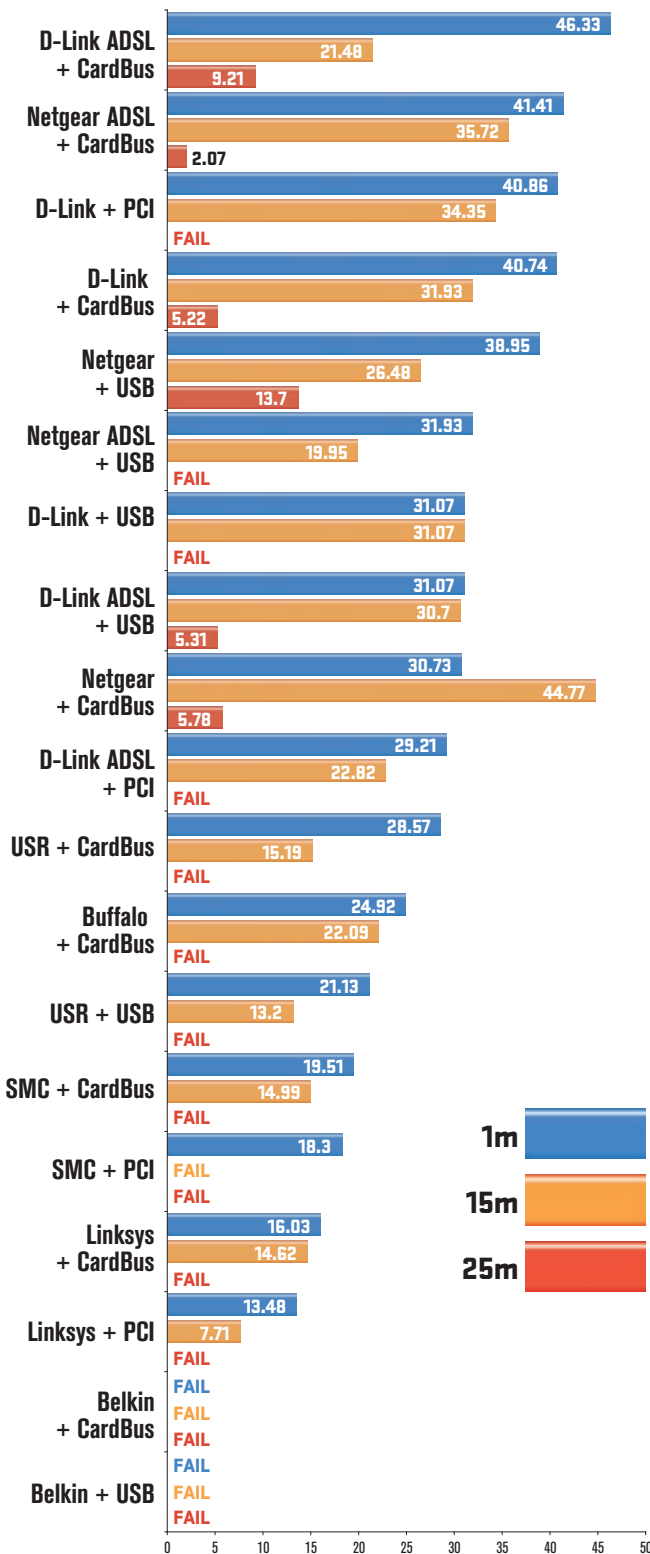
- ☒ Fast at medium range
- ☒ Clear web interface
- ☒ Expensive

ADSL WIRELESS ROUTER 802.11g (125Mbit/s), four 10/100 LAN ports, WAN port (ADSL2+ modem), UPnP PART CODE USR019108A SUPPLIER www.morecomputers.co.uk CARDBUS WIRELESS ADAPTOR 802.11g (125Mbit/s) PART CODE USR805411A SUPPLIER www.morecomputers.co.uk USB WIRELESS ADAPTOR 802.11g (125Mbit/s) PART CODE USR805421A SUPPLIER www.morecomputers.co.uk DETAILS www.usr.com

BENCHMARKS

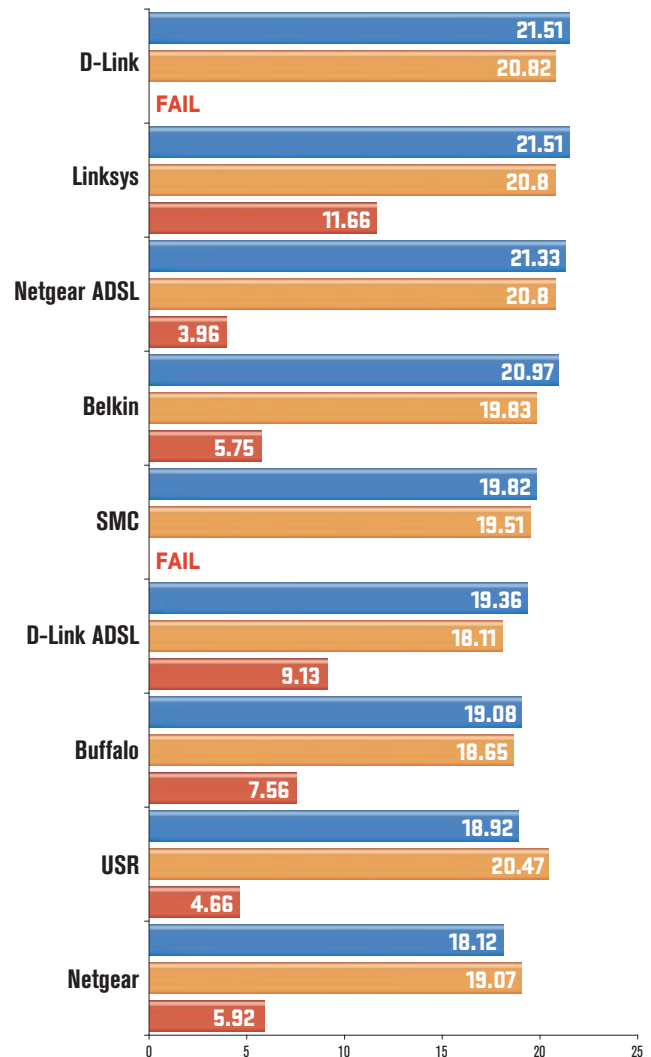
Router speed Transfer speeds at 1m, 15m and 25m ranges

With own-brand adaptor (Mbit/s)



We used a file-transfer test to determine the speed at which each router can transfer data wirelessly. Each test was carried out using an adaptor of the same brand (above), and we repeated each test at three distances from the adaptor: 1m, 15m and 25m. We also tested the speed at which each router could transfer data to a standard Centrino notebook adaptor (above, right). Again, we performed this test at three distances.

With Centrino notebook (Mbit/s)



How we test Wireless networking

When choosing wireless networking equipment, it's important that you consider how easy it is to set up, how quickly it can transfer data and what range the network has. We set up each router and install each wireless adaptor according to the manufacturer's instructions, using WPA encryption in all our tests. To measure network speeds we plug each router into a desktop PC, and connect to the wireless network with an Intel Centrino-based notebook. With the notebook a metre away and using the notebook's integrated wireless chip, we run a batch file that times how long it takes to transfer a 100MB file to the desktop PC three times.

To test the network's range, we repeat this performance test at distances of 15m and 25m indoors. In both tests there are walls between the wireless devices, just as there would be in a home environment.

We then repeat the entire suite of tests with the router's matching CardBus, USB and PCI network adaptors to see how any non-standard transfer modes boost the performance or range.

If the router's file-transfer speed seems unexpectedly slow, we try various wireless channels to eliminate background interference and improve throughput. We may also try changing wireless modes, as some of the Draft-N routers would work properly only if we disabled their turbo modes.

WIRELESS NETWORKING

	BUDGET BUY				BEST BUY		BEST BUY		
MANUFACTURER	BUFFALO	SMC	US ROBOTICS	LINKSYS	NETGEAR	NETGEAR	D-LINK	D-LINK	BELKIN
MODEL	Wireless G Broadband ADSL2+ Modem Router	Barricade g Wireless ADSL2+ Router	Wireless MAXg ADSL2+ Gateway	Wireless N Broadband Router	RangeMax Next Wireless Router	RangeMax Next Wireless ADSL2+ Modem Router	RangeBooster N ADSL2+ Router	RangeBooster N 650 Gigabit Router	N1 Wireless Modem Router
Rating	★★★★★	★★	★★★	★★★	★★★★★	★★★★★	★★★★★	★★★★	★★
Modem type	ADSL2+	ADSL2+	ADSL2+	None	None	ADSL2+	ADSL2+	None	ADSL2+
802.11b support	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
802.11g support	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Draft 802.11n support	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
MIMO	No	No	No	Yes	Yes	Yes	No	No	Yes
Turbo mode	None	None	Frame bursting and packet aggregation	Channel bonding	Channel bonding	Channel bonding	Channel bonding	Channel bonding	Channel bonding
Stated speed	54Mbit/s	54Mbit/s	125Mbit/s	300Mbit/s	270Mbit/s	270Mbit/s	270Mbit/s	300Mbit/s	270Mbit/s
SECURITY									
256-bit WEP	No	No	No	No	No	No	No	No	No
128-bit WEP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
WPA PSK	PSK	PSK, RADIUS	PSK, RADIUS	PSK, RADIUS	PSK	PSK	PSK	PSK, RADIUS	PSK, RADIUS
WPA2	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firewall	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MAC address filtering	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DMZ	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PHYSICAL									
Dimensions including antenna (HxWxD)	32x200x119mm	30x156x133mm	34x234x128mm	36x169x174mm	226x38x175mm	226x38x175mm	27x220x150mm	32x194x118mm	36x236x182mm
Antennas	1	1	1	3	6	6	3	3	3
Internal/external antennas	External	External	Internal	External	Internal	Internal	External	External	External
Antenna socket	Yes	Yes	Yes	No	No	No	Yes	Yes	No
WAN ports	1	1	1	1	1	1	1	1	1
LAN ports	4x 10/100Mbit/s	4x 10/100Mbit/s	4x 10/100Mbit/s	4x 10/100Mbit/s	4x 10/100Mbit/s	4x 10/100Mbit/s	4x 10/100Mbit/s	4x 10/100/1,000Mbit/s	4x 10/100Mbit/s
Other ports	None	None	None	None	None	None	None	None	None
Wall mountable	Yes	Yes	No	No	No	No	Yes	Yes	Yes
OTHER FEATURES									
Dynamic DNS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
UPnP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DHCP server	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MAC spoofing	No	Yes	No	Yes	Yes	No	No	Yes	No
Port forwarding	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
WDS support	No	Yes	Yes	No	No	No	Yes	No	No
USB device support	No	No	Yes	No	No	No	No	Yes	No
BUYING INFORMATION									
Price including VAT	£37	£43	£62	£79	£89	£92	£107	£108	£120
Warranty	Two years	Five years	Two years	Three years	Two years	Two years	Two years	Two years	Lifetime
Supplier	www.lambda-tek.com	www.broadbandstuff.co.uk	www.morecomputers.co.uk	www.morecomputers.co.uk	www.lambda-tek.com	www.microdirect.co.uk	www.lambda-tek.com	www.lambda-tek.com	www.morecomputers.co.uk
Details	www.buffalo-technology.com	www.smc.com	www.usr.com	www.linksys.com	www.netgear.com	www.netgear.com	www.d-link.com	www.d-link.com	www.belkin.com/uk
Part code	WBMR-G54	SMC7904WBRA2	USR019108A	WRT300N-UK	WNR834B	DG834N	DSL-2740B	DIR-655	F5D8631UK4A

Labs verdict Wireless networking

The most important conclusion to draw from this *Labs* test is that the speed claims made by wireless equipment manufacturers shouldn't be taken too seriously. Draft-N equipment is generally faster than 54g kit, but by nowhere near the amount claimed. Some of the Draft-N routers and adaptors had trouble working or were slower than 54g equipment. We'd recommend waiting until the bugs have been ironed out, but for those who must have the fastest wireless equipment currently available, a few Draft-N products did impress.

If you need a Draft-N router with an integrated ADSL modem, there are two good options. D-Link's RangeBooster N has the best long-range performance and is perfect if you've experienced a poor signal at home. If you're unlikely to stray more than 20m from your

router, Netgear's RangeMax Next Wireless ADSL2+ Modem Router is the perfect choice. It produced the best performance in the group when it was paired with Netgear's notebook CardBus adaptor, and both products win a Best Buy award.

The non-ADSL version of Netgear's RangeMax Next works very well with both Netgear's CardBus and USB adaptors. It wins our Best Buy for non-ADSL connections.

If you just want to share a broadband internet connection or you aren't too fussed about high file-transfer speeds, you can save a packet with a standard 54g router. Buffalo's WBMR-G54 may not have a particularly pretty interface, but it's reasonably fast and very good value. It and the matching CardBus adaptor pick up a Budget Buy award.

NETGEAR RangeMax Next Wireless ADSL2+ Modem Router
★★★★★



NETGEAR RangeMax Next Wireless Router
★★★★★



NETGEAR RangeMax Next Wireless Notebook Adaptor
★★★★★



BUFFALO Wireless G Broadband ADSL2+ Modem Router
★★★★★



BUFFALO High Power Wireless CardBus Adaptor
★★★★★

